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Cooperation and optimism in a social dilemma

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Abstract

We examine the influence of optimism about local and foreign people on social cooperation using a public goods game. Firstly, we find that optimism fuels social cooperation, and secondly, that this positive effect holds when optimism is focused either jointly or individually.

Keywords: Beliefs, Optimism, Public Goods Game

JEL: C91, H41, J15

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1. **Introduction**

The pre-eminent social value of cooperation in fulfilling human needs based on diverse motivations as suggested by Maslow (1943) cannot be over-emphasized. This value is well-exploited in social constructs like families, organizations, communities and even nation-spaces.

Social cooperation, its evolution and stability can be understood from a number of perspectives: social value orientation (see Balliet et al., 2009); social norms (e.g., Buckholtz & Marois, 2012; Fehr & Fischbacher, 2004); group bias (e.g., Dorrough et al., 2015; McAuliffe & Dunham, 2016); conditional cooperation or reciprocity (e.g., Kocher et al., 2008; Fischbacher & Gaechter, 2010; Smith, 2013); context-specificity (e.g., Rand & Nowak, 2013); and so on.

Economic studies (e.g., Croson, 2007) have shown that personal beliefs about the cooperative behaviour of group members correlate with an individual's own contributions. This contribution in turn can be explained by commitment, altruism and reciprocity theories. The commitment approach suggests that own contributions will be positive and constant or unconstrained by others' contributions (see Laffont, 1975); the altruism approach also implies positive own contributions which may be inversely-related to others' contributions (see Andreoni, 1989, 1990); finally, reciprocity theories imply contributions that are positively related to others' contributions (see Kocher et al., 2008; Sugden, 1984). From evolutionary biology, theoretical explanations suggest that it is to individual's benefit (or self-interest) if social cooperation is directed towards the in-group; but costly to the decision maker (but beneficial to the recipient) if directed toward out-group (Hamilton, 1964). A special case of indirect benefits is altruism, where the behavior is costly to the decision maker and beneficial to the recipient (West et al. 2007).

Group optimism effects on individual social cooperation remain inadequately explored given that most studies are focused on "in-group favouritism versus out-group prejudice" divide which depicts only a scenario out of four possible group belief scenarios that include "in-group pessimism versus out-group pessimism", "in-group pessimism versus out-group optimism", and "in-group optimism versus out-group optimism". Specifically, this study is novel in exploring social cooperation across a range of group optimism standpoints (in-group; and out-group)[1]. These show the effects on cooperation separately and combined, coupled with other personal characteristics, in a public goods setting. In generally terms, we find that being optimistic about either group promotes social cooperation.

The next section sets out our methodology, followed by the results, and lastly, the conclusions.

[1] In-group = Spanish; out-group = combination of Africans, Asians, Latin Americans and Western which is defined as native English-language speakers e.g., Americans, Britons, Canadians, Australians etc.

2. **Experimental design and procedures**

The basic game is a standard voluntary contribution mechanism. We set up groups of four members who interact for 5 periods. Every subject is endowed with 100 coins (of 2 euro cents each). In Task 1, each subject decides how much to allocate between her private account and a public account, with $c_{i,t} \in [0, 100]$. Task 1's payoffs in period t are given by $\pi_{it} = 100 - c_{it} + 0.375 \sum_{j=1}^{4} c_{jt}$.

Task 2 required participant *i* to make guesses about the mean contributions to the public account (in number of coins) of the entire group of participants (including their selves) for each round. We created an incentive scheme contingent upon errors, $e_{i,t} = g_{i,t} - \bar{c}_t$ where $g_{i,t}$ is the guess of subject *i* in period t, and $\bar{c}_t$ is the observed mean contribution for round *t*. This scheme is set out as follows:

- if $|e_{i,t}| > 10$, subject *i* received 0 euros;
- if $5 < |e_{i,t}| \leq 10$, subject *i* received 1 euro;
- if $0 < |e_{i,t}| \leq 5$, subject *i* received 2 euros; and
- if $e_{i,t} = 0$, subject *i* received 20 euros.

Participant *i*'s payoff in Task 2 is determined by using only one of the five rounds selected at random.

On completion of this task, participants were instructed on how to compute the mean of their guesses: $\bar{g}_{i,loc} (= \frac{\sum_{t=1}^{5} g_{i,t}}{5})$. Task 3 then required participant *i* to make guesses about the average contribution of each of the four out-group populations (African, Asian, Latin American, and Western). Participants were informed that similar experiments had been performed in other parts of the world.[2] The payment system in Task 3 is similar to that of Task 2. Finally, in Task 4 participants answered a set of questions designed to elicit information on their personal and family characteristics, and beliefs. These included gender, exposure to foreign travel, sport participation, political beliefs, parental education, participation in household tasks, and household culture. The complete experiment lasted approximately one hour with participants earning 13.47 euros on average.

The experiment was conducted in two waves at the University of Granada, Spain with 152 first-year Economics students (68 females, age-range 17-41, mean age 19.02, SD age 2.32) as participants. The first wave was conducted in 2007 and the second wave in 2011 with sample sizes of 48 and 104 respectively.

[2] For the four out-groups under study, the actual average contribution data ($\bar{c}_{afr} = 51.75$; $\bar{c}_{asn} = 24.89$; $\bar{c}_{lat} = 48.75$; $\bar{c}_{wes} = 20.30$) used in computing the payoffs were sourced from previous studies (Herrmann et al., 2008; Cardenas and Carpenter, 2008).

3. **Results**

On average, subjects contributed 35.45 coins (SD 20.68) to the public good in the course of the five rounds of the experiment; this average was 28.47 (SD 19.33) coins in the first wave of the experiment and 38.67 (SD 20.58) in the second wave.

Table 2 shows the real average contribution and the average guess of each group (Locals, Africans, Asians, Latin Americans, and Western). Angerer et al. (2016), in a prisoner's dilemma game, show that young children have difficulty guessing the average contribution of other children but this difference declines with age. We find no large errors in our (university) student sample when guessing the average contribution of locals (4.37 tokens), but the difference between guess and real contribution increases when subjects have to guess the behavior of foreigners performing the same task. The average error (in absolute value) when making guesses about foreigners goes up from 6.64 to 20.74.

	Real avg contribution	Avg guess	Min error	Max error	Average error	Std. Dev. of error	% Positive error
Locals	35.45	39.81	-32.45	42.55	4.37	14.42	63.8%
Africans	51.75	45.11	-51.75	48.25	-6.64	24.41	38.8%
Asians	24.89	45.63	-24.89	67.11	20.74	19.54	85.5%
LatinAmericans	48.75	39.25	-46.75	41.25	-9.50	16.13	29.6%
Westerns	20.30	40.12	-17.30	69.70	19.82	16.63	86.8%

Table 1: Contributions and errors

Since our objective is to study the relation between the own average contribution and group optimism, we created the variable *Optimism* that takes value 1 if the *Guess* about group *j* is above the *Real average contribution* of this group (*j* = Locals, Africans, Asians, Latin Americans, and Western) and 0 otherwise. If a subject is optimistic about the contribution of 3 or 4 foreign groups, this subject is considered optimistic about foreigners. This approach seems plausible because our interest includes exploring the combined out-group optimism (instead of individual group optimism) effects on social cooperation.

Interestingly, subjects' optimism between in-group versus out-group is 61.8% to 46.1%; while within the out-group, it is highest to the Western (86.8%) followed by Asians (85.5%), and next is the Africans (38.8%), and the least is to the Latin Americans (29.6%).

The average own contributions of these 4 types of subjects are shown in Table 2 below.

Subject Type	N	Mean	Std. Deviation
Not Optimistic	44	24.60	14.72
Optimistic about locals only	38	35.00	20.03
Optimistic about foreigners only	14	39.76	22.26
Optimistic about both groups	56	43.55	21.39
Total	152	35.45	20.68

Table 2: Average contribution by subject type

An ANOVA allows us to reject the equality of means (p-value = 0.000). Post-hoc tests show that the average contributions of the non-optimistic subject type is statistically different from the average contribution of the other 3 groups (all p-values < 10%), while the average contributions of the other 3 types of subjects are not statistically different from each other (all p-values > 10%).

Table 3 shows the results of an OLS regression where the dependent variable is the average own contribution and the independent variables are the subject type (the excluded category is *Not-optimistic*) and personal control variables (sex, foreign exposure, sport exposure, political beliefs, parental education, household chores, household culture, and the wave of the experiment).[3]

Dependent variable: Average own contribution			
	Coefficient	Std. Err.	P-value
Optimistic about locals only	10.28	4.40	0.021
Optimistic about foreigners only	13.23	6.13	0.033
Optimistic about both groups	17.03	4.39	0.000
Female	5.16	3.42	0.134
Foreign Exposure	3.63	3.98	0.363
Sport Exposure	-3.22	4.33	0.458
Political Belief	-0.03	1.40	0.983
Parental Education	0.01	0.33	0.973
Household Chores	-0.91	1.10	0.409
Household Culture	-0.72	1.41	0.608
Wave	4.02	3.95	0.311
Constant	19.65	4.60	0.000
Nb observations	152		
Prob > F	0.002		

Table 3: Estimation of the contributions to the public good

[3] A brief description of the control variables is offered in the appendix.

Table 3 shows that the average own contribution is highest if the subject is optimistic about both groups (locals and foreigners), but it is also higher than the omitted category (*Not-optimistic*) if the subject is optimistic about only one of the two groups.[4]

Interestingly, optimism about the contributions of foreigners whose behavior will not affect subjects' payoffs in any way increases their contributions to the public goods.

None of the control variables has significant effects on the average own contribution.

4. Conclusions

Often the influence of group identification in social cooperation has been explored from the restrictive perspective of in-group favoritism versus out-group prejudice. This study has focused on exploring optimism about both groups in social cooperation.

Our results show first that the positive relationships observed between both in-group optimism and out-group optimism on social cooperation are consistent with theories of reciprocity and altruism.

Secondly, we find that being optimistic about the in-group, or the out-groups, or about both types of groups at the same time does not have different effects on subjects' cooperation.

Finally, the finding of no difference in average cooperation between in-groups and out-groups suggests that simple binary social categorization ("us" and "them") is inappropriate for more complex behavior (Tajfel, 1982). This may be because the elementary, relational, and egocentric forms of simple binary categorization are cognitively inadequate in more complex social cooperation (Shkurko, 2014), but this evidently requires further study.

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[4] Nonetheless, running regressions excluding other categories, we find that subjects belonging to the other 3 categories do not behave differently in terms of average own contributions to the public good.

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Appendix: Description of the control variables

Female: It shows the gender of the subject. $Female_i$ =1 if the subject is female, and $Female_i$ = 0 otherwise.

Foreign Exposure: It is a measure of the number of foreign trips earlier undertaken by the subject and it takes value 0 if the number of country-trips < 3 and takes value 1 otherwise.

Sport Exposure: This is a measure of the type of sporting activities engaged in by the subjects and it takes value 1 if at least one "expensive sport" is practiced by the subject, and 0 otherwise. We consider as "expensive sports": golf, paddling, rugby, ski, surf, and tennis.

The two variables Foreign Exposure and Sport Exposure are used as indicators of the individual wealth of the subjects.

Political beliefs: It goes from −3 (least conservative) to +3 (most conservative).

Parental education: It is a measure of the joint educational status of both parents and was computed as = Education of mother ∗ Education of father with both going from 1 (basic education) to 4 (highest education).

Household Chores: This is a measure of the schedule of household chores among family members and it goes from −3 (most poorly divided) to +3 (equally divided).

Household Culture: It is a measure of the schedule of household leisure activities among family members and it goes from −3 (only indoor leisure) to +3 (include outdoor leisure).

Wave takes value 1 if the experiment was conducted during the 2011 wave, and 0 if it was conducted in 2007.